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001/017

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PTO/SB/21 (03-03)

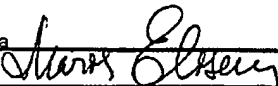
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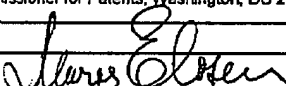
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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	10/604,302	
	Filing Date	July 9, 2003	
	First Named Inventor	Hans-Artur Bosser	
	Art Unit	2877	
	Examiner Name	Gabor, Otilia	
Total Number of Pages in This Submission	17	Attorney Docket Number	21295.55

ENCLOSURES (Check all that apply)		
<input checked="" type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input checked="" type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation <input type="checkbox"/> Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> After Allowance Communication to a Technology Center (TC) <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input checked="" type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input type="checkbox"/> Other Enclosure(s) (please identify below):
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PTO/SB/17 (01-06)

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Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
For FY 2006☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$)

1520

Complete if Known

Application Number	10/604,302
Filing Date	July 9, 2003
First Named Inventor	Hans-Artur Bösser
Examiner Name	Gabor, Otilia
Art Unit	2878
Attorney Docket No.	21295.55

METHOD OF PAYMENT (check all that apply)☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify):☒ Deposit Account Deposit Account Number: 502233 Deposit Account Name: Houston Eliseeva LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☒ Charge fee(s) indicated below☐ Charge fee(s) indicated below, except for the filing fee☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17☒ Credit any overpayments

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FEE CALCULATION (All the fees below are due upon filing or may be subject to a surcharge.)**1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	300	150	500	250	200	100	10604302
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	502233
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES**Fee Description**

Each claim over 20 (including Reissues)

Fee (\$)

50

Each independent claim over 3 (including Reissues).

200

Multiple dependent claims

360

Total Claims**Extra Claims**

Fee (\$)

Fee Paid (\$)

- 20 or HP =

x

=

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims**Extra Claims**

Fee (\$)

Fee Paid (\$)

- 3 or HP =

x

=

HP = highest number of independent claims paid for, if greater than 3.

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequences or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets**Extra Sheets**

Number of each additional 50 or fraction thereof

Fee (\$)

Fee Paid (\$)

- 100 =

/ 50 =

(round up to a whole number) x

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

Fees Paid (\$)

Other (e.g., late filing surcharge): appeal brief, three month extension fee

1520

SUBMITTED BY

Signature

Registration No.
(Attorney/Agent) 43.328

Telephone 791-863-9991

Name (Print/Type) Maria Eliseeva

Date July 21, 2006

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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In Re: Hans-Artur Bösser Confirmation No: 1301
Serial No: 10/604,302 Group: 2878
Filed: July 9, 2003 Examiner: Gabor, Otilia
For: Apparatus and Method for
Calibration of an Optoelectronic
Sensor and for Mensuration of
Features on a Substrate
Customer No.: 29127
Attorney 21295.55
Docket No.

APPELLANT'S BRIEF

VIA FACSIMILE: 571-273-8300
Mail Stop Appeal Brief- Patents
Commissioner for Patents
P.O. Box 1450,
Alexandria, Virginia 22313-1450

Sir:

This is the Applicants' appeal from the final Office Action, mailed on October 18, 2005.

Real Party in Interest

Leica Microsystems Semiconductor GMBH, the Assignee of the present application is the real party in interest.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 1-17 are pending in the application. Claim 1-17 have been rejected and the rejection is being hereby appealed.

07/25/2006 BABRAHA1 00000031 502233 10604302

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Status of Amendments

The amendment filed after final Office Action was rejected and not entered. The amendment filed before final Office Action has been entered.

Summary of Claimed Subject Matter

What has been recognized according to the present invention is that varying measurement results in the context of high-accuracy measurements with UV light are caused by the sensor. The response characteristic of the sensor changes as a result of the irradiation with UV light. By ascertaining and correcting the response characteristic of the sensor, the light quantity actually received can be ascertained. The measurement results derived from the sensor signals can thereby be corrected.

With the apparatuses and methods according to the present invention it is thus possible to determine quantitatively the properties of the sensor in the context of UV exposure. The changes to the sensor are brought about by UV light radiation damage. That damage depends on the total UV light dose received by the sensor. Since the radiation damage is permanent, the properties of the sensor change continuously with the received dose. A calibration of the sensor after certain dose quantities or after certain UV exposure times, in accordance with the methods and apparatus according to the present invention, results in an accurate determination of the received light quantities and therefore in accurate quantitative evaluations.

The radiation damage to the sensor depends not only on the UV intensity but also, to a certain extent, on the UV wavelength. Certain UV wavelength regions can cause greater radiation damage to the sensor.

The effect of the radiation damage on the sensor's sensitivity, on the other hand, is also wavelength-dependent. The response characteristic of the sensor is therefore preferably determined at the wavelength at which the measurements are to be taken, or the images acquired, with the sensor. If the sensor is used at several wavelengths, the

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calibration of the sensor is performed at those different wavelengths.

If, on the other hand, one wavelength region of the light is used for the measurements, or for illumination and image acquisition, the calibration according to the present invention of the sensor can be performed using light of that continuous wavelength region having the corresponding spectral distribution. Either the wavelength region being used is acquired continuously as overall light, or the calibration is performed at individual wavelengths from that region and then weighted or averaged for the region.

Many UV light sources not only emit a continuous spectrum but also exhibit a particularly high intensity at certain wavelengths. In many applications the UV light is therefore used specifically at those wavelengths. Such particular wavelengths are, for example, 266 nm, 248 nm, 193 nm, or 157 nm (deep UV), which are emitted by discharge lamps such as mercury/xenon or deuterium lamps, or by argon or excimer lasers. In steppers, light of these wavelengths is used to expose wafers, the features of masks being imaged onto the wafers. UV light of these wavelengths is similarly used for image acquisition in UV microscopes. Here the specimens, e.g. the features on the masks or wafers, are illuminated with UV light and imaged in a camera using a spatially resolving optoelectronic sensor, and made visible by image processing.

Other features on different materials, for example biological structures, can of course also be made visible and measured in this manner.

The radiation damage to the sensor not only is caused by illumination of the sensor with UV light but also affects the sensor's response characteristic over the sensor's entire sensitive wavelength range. The sensitivity of the sensor in visible and infrared light is therefore also impaired when it has received a certain dose of UV light. In such circumstances, calibration according to the present invention of the sensor is also necessary at the visible or infrared light wavelengths if accurate measurements are to be performed, or images acquired, in that wavelength region as well. Images are often

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acquired both in the visible region and with UV light, in order to obtain additional information. Calibrations of the sensor in the corresponding visible and UV regions are therefore advantageous, especially if mensuration of the imaged specimens is to be performed by image processing.

Grounds of Rejection to be Reviewed on Appeal

I. Whether claims 1-17 are non-obvious under 35 U.S.C. §103(a) over Engelhardt (U.S. Patent 6,355,919) and further in view of Brody *et al.* (U. S. Patent 3,645,627).

Arguments

I. With regard to Issue I on appeal, Applicant argues as follows.

The Patent Office has not created a *prima facie* case for obviousness. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the cited publications themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the publication or to combine its teachings. Second, there must be a reasonable expectation of success. Finally, the publication (or publication when combined) must teach or suggest each and every element of the claim¹. With regard to some suggestion or motivation to modify the publication or to combine publication teachings, as well as to a reasonable expectation of success, it has been well articulated that a factual inquiry whether to combine publications must be based on objective evidence of record² and that teachings of publications can be combined only if there is some suggestion or incentive to do so³.

Claim 1 is directed to a method of calibrating an optoelectronic sensor upon exposure to the UV light. The change in sensitivity of the optoelectronic sensor due to

¹ MPEP 2142-2143

² In re Lee, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002).

³ In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988).

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irradiation with the UV light is ascertained and correction of the measurements taken by the optoelectronic sensor due to the UV light exposure is performed.

The Examiner combined the patents of Engelhardt and Brody to reject Claim 1 under 35 U.S.C. §103(a).

Applicant asserts that this citation would have been proper only if considered by a person of average skill in the art at the time the invention was made. It has been well established that a person skilled in the art is not a layperson, nor one skilled in remote arts⁴.... Applicant asserts that Brody is remote, non-analogous art that should not have been combined with Engelhardt to make the rejection.

To determine whether a publication is analogous, two criteria are used: 1) whether the art is from the same field of endeavor, and 2) if the publication is not from the same field of endeavor, whether it is still reasonably pertinent to the particular problems with which the inventor is involved. If a cited publication is directed to a different purpose, the inventor, accordingly, have had less motivation or occasion to consider it.⁵

In view of this standard, Brody is a non-analogous publication. Brody's disclosure describes an instrument which

"includes a cavity 11 into which a burner tip 12 projects to provide a flame (not shown) whose cone may be shielded by a shield extending above tip 12, such that only the region of the flame above the cone is observable. Emissions within that region attributable to components or materials whose presence in the sample being burned is to be determined are detected by incidence of radiant energy at the wavelength or wavelengths associated with flame emission from those materials on a photomultiplier tube 13, after passage through an optical filter 14 selective with respect to that wavelength." (Col. 2, lines 50-60, emphasis added).

⁴ Environmental Designs, Ltd. v. Union Oil Co., 713 F.2d 693 (Fed. Cir. 1983).

⁵ *In re Clay*, 966 F.2d 656, 23 USPQ2d 1058, (Fed. Cir. 1992), see also *Heidelberger DruckmaschinenAG v. Hantscho Comm. Prods., Inc.*, 21 F 3d 1068, 30 USPQ2d 1377 (Fed. Cir. 1994).

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Further in that patent Brody goes on to describe that the burner tip of his instrument

“is fed with fuel gas, such as hydrogen, via an inlet 26, the fuel gas not being intermixed with the combustion-supporting gas, such as air, until the gases exit the burner tip. The air is introduced through inlet 27. The air acts also as a carrier for the gas or other substance under investigation. The gases supplied to the burner tip are ignited via an ignition port closed by a plug 28, and the products of combustion are exhausted through an exhaust port 30.” (Col. 3, lines 6-13, emphasis added)

The field of endeavor and the instrument of Brody are in the field of analyzing emissions by burning the combustion-supporting gas and air and analyzing emission flames.

The present invention as claimed in Claim 1 has nothing to do with burning gases and analyzing flame induced emissions. The Brody field of endeavor is very different from the field of correcting measurements in a high resolution optical microscope having an optoelectronic sensor whose sensitivity is affected by exposure to the UV light during analysis of very fine features on semiconductor wafers. The problem of analyzing flame induced emissions is not reasonably pertinent to the problem of correcting the dimensional measurements of the features on a semiconductor wafer by calibrating an optoelectronic sensor using the first response characteristic and UV light exposure response. (The analyzed features on a wafer could be 650 nm small, for example, see paragraph [0074]). Therefore, it is extremely unlikely that a person of average skill in the art of the present invention would have any motivation or occasion at all to consider the teachings of Brody.

It is only logical to conclude that since Brody is non-analogous and non-pertinent art relative to the field of endeavor of present invention, there is no (and could be no) objective evidence anywhere in the record that the teachings of Engelhardt and Brody could be combined to successfully provide the method of calibrating an optoelectronic sensor as claimed in Claim 1.

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With regard to the requirement of the prima facie case of obviousness that the combination of Engelhardt and Brody must teach each and every element of Claim 1, Applicant argues that the cited combination fails to satisfy that requirement.

In the final Office Action the Examiner wrote that “Brody discloses calibrating a sensor (13) response by illuminating the sensor (13) with a first light quantity from a reference light source (20) and measuring and storing the first sensor output; then varying the light quantity from the source (20) using a controller that controls the light quantity output from the reference light source (20);...” (page 3 of the final Office Action).

Contrary to the Examiner's assertion, Brody discloses no such method. The fact that Brody talks about some calibration and that in general calibration is defined in the Webster dictionary does not prove that Brody discloses the specific calibration steps claimed in Claim 1.

In particular, Brody discloses no varying of the quantity of reference light reaching PM tube 13. Completely contrary to the Examiner's assertion, Brody describes a source 20, which is phosphor, because it “provides a relatively **constant light intensity** or output.” (Col. 3, lines 46-47). Furthermore, Brody goes on to describe that since the optical path of the phosphor emission is substantially the same as that of the flame-induced emissions, it follows that the reference or **calibration light is subjected to attenuation from the same factors** that act upon the signal, i.e., the flame emissions at the wavelengths under consideration. (Col. 3, lines 61-65, emphasis added). Brody doesn't mention calibrating PM tube 13 at all (or its response as a function of exposure to light), because Brody calibrates attenuation of the signal over the optical path inside its instrument.

Nothing in the description of calibrating a flame emission analyzing instrument of Brody even remotely suggests that the quantity of the reference light is varied in order to obtain the first response characteristic of the optoelectronic sensor and to calibrate the change in response of the optoelectronic sensor itself caused by exposure to light (the UV light). Therefore, the combination of Engelhardt and Brody does not teach each and every element of Claim 1.

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In view of the above-presented arguments, Applicant asserts that the rejection of Claim 1 should be withdrawn and Claim 1 should be allowed.

With regard to **Claim 11**, each and every argument presented above is applicable to support patentability of Claim 11. Claim 11 is directed to a method for measuring features on a substrate using a UV microscope and a spatially resolving optoelectronic sensor. Applicant emphasizes that the problem of analyzing flame induced emissions of Brody is not reasonably pertinent to field of endeavor relevant to Claim 11. Therefore, it is extremely unlikely that a person of average skill in the art of the present invention would have any motivation or occasion to consider the teachings of Brody.

Additionally, Applicant asserts that neither Engelhardt nor Brody nor their combination discloses measuring the features by image processing using the corrected response characteristic of the sensor.

For all of the above-presented reasons, Applicant asserts that the rejection of Claim 11 should be withdrawn and Claim 11 should be allowed.

With regard to **Claim 12**, each and every argument presented above is applicable to support patentability of Claim 12. For all of the above-presented reasons, Applicant asserts that the rejection of Claim 12 should be withdrawn and Claim 12 should be allowed.

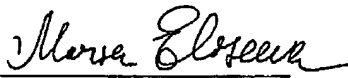
With regard to **Claim 17**, each and every argument presented above is applicable to support patentability of Claim 17. Additionally, neither Engelhardt nor Brody describes an evaluation unit for evaluating the features by image processing using the corrected response characteristic of the optoelectronic sensor. For all of the above-presented reasons, Applicant asserts that the rejection of Claim 17 should be withdrawn and Claim 17 should be allowed.

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For the foregoing reasons, Applicant believes that the pending rejection should be withdrawn, and that the present Claims should be allowed and passed to issue. Should any questions arise, please contact the undersigned.

Respectfully submitted,

Houston Eliseeva LLP

By 

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Date: July 21, 2006

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Claims Appendix

1. (Previously Presented) A method for calibration of an optoelectronic sensor irradiated at least intermittently with UV light, comprising the following steps:
 - obtaining a first response characteristic of the sensor by
 - illuminating the sensor with the light of at least one light source,
 - varying the light quantity of the light incident onto the sensor,
 - determining the magnitude of an electrical output signal of the sensor as a function of the light quantity received by the sensor;
 - storing the first response characteristic; and
 - acquiring response characteristics at later points in time after illuminating the sensor with UV light;
 - calibrating the sensor by comparing the response characteristics to the first response characteristic in order to identify changes and to correct the response characteristics.
2. (Previously Presented) The method as defined in Claim 1, wherein the light quantity incident onto the sensor is varied by introducing at least one filter into an illuminating beam path between the light source and the sensor.
3. (Previously Presented) The method as defined in Claim 2, further comprising more than one filter being an absorption filter or a scattering filter in varying numbers and/or having a varying absorption or scattering effect, or a gray wedge, disposed in the illuminating beam path.
4. (Original) The method as defined in Claim 1, wherein the light quantity incident onto the sensor is varied by modifying the aperture of an aperture stop introduced into the illuminating beam path between the light source and the sensor, or by way of aperture stops having different apertures.

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5. (Original) The method as defined in Claim 1, wherein the light quantity incident onto the sensor is varied by way of an electronically controlled exposure time.
6. (Previously Presented) The method as defined in Claim 1, wherein the response characteristics are obtained at those light wavelengths at which the sensor is used for measurement or observation tasks.
7. (Original) The method defined in Claim 1, wherein the sensor is used as a spatially resolving sensor, and UV images are acquired with the sensor.
8. (Original) The method as defined in Claim 7, wherein features of imaged specimens are measured by image processing.
9. (Original) The method as defined in Claim 1, wherein the method is used in a UV microscope.
10. (Original) The method as defined in Claim 9, wherein feature widths and/or spacings on substrates, in particular on masks or wafers in semiconductor fabrication, are measured.
11. (Previously Presented) A method for measuring features on a substrate using a UV microscope and a spatially resolving optoelectronic sensor, comprising the steps:
 - acquiring UV images of the features on the substrate;
 - calibrating the sensor from time to time, by
 - obtaining a present response characteristic of the sensor by way of the variation of a UV light quantity received by the sensor,
 - comparing and correcting the present response characteristic using a first response characteristic obtained by illuminating the sensor with the light of at least one light source, varying the light quantity of the light incident onto the sensor, determining the magnitude of an electrical output signal of the sensor

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- as a function of the light quantity received by the sensor, and storing the first response characteristic;
- comparing and correcting the present response characteristic; and
 - measuring the features by image processing using the corrected response characteristic of the sensor.
12. (Previously Presented) An apparatus for calibration of an optoelectronic sensor irradiated intermittently with UV light, comprising:
- at least one light source for illuminating the sensor;
 - calibration means for varying the light quantity incident onto the sensor and for obtaining a first response and a present response characteristic of the sensor, the present response being obtained after irradiating the sensor with the UV light;
 - an evaluation unit for correcting the present response characteristic of the sensor using the first response; and
 - a memory for storing at least the first response characteristic.
13. (Original) The apparatus as defined in Claim 12, wherein the calibration means are absorption filters, scattering filters, a gray wedge, aperture stops having various openings, an aperture stop having a variable opening, or an exposure control system for setting different exposure times.
14. (Original) The apparatus as defined in Claim 12 wherein a control device for automated use of the calibration means is provided.
15. (Original) The apparatus as defined in Claim 12, wherein the apparatus is provided in a UV microscope.
16. (Original) The apparatus as defined in Claim 15, wherein the apparatus is provided for the measurement of feature widths and spacings.

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17. (Previously Presented) An apparatus for measuring features of a substrate, comprising
- a UV microscope and a spatially resolving optoelectronic sensor for acquiring UV images of the features on the substrate;
 - calibration means for calibrating the sensor, wherein a first response characteristic is obtained by illuminating the sensor with the light of at least one light source, varying the light quantity of the light incident onto the sensor, determining the magnitude of an electrical output signal of the sensor as a function of the light quantity received by the sensor, and a present response characteristic of the sensor are obtained by irradiating the sensor by UV light of varying a light quantity incident onto the sensor; and
 - an evaluation unit
 - for correction-of the present response characteristic using the first response characteristic, and
 - for evaluating the features by image processing using the corrected response characteristic of the sensor.

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Evidence Appendix

None

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Related proceedings appendix

None